MOOSE SURVEYS IN MACKENZIE RIVER DELTA, VALLEY AND TRIBUTARIES, 1980

Northwest Territories Renewable Resources
Wildlife Service
The Honourable Nellie Cournoyea, Minister

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ABSTRACT

Both strip transect and total count surveys of moose were carried out in the Mackenzie Valley and adjacent major rivers north of Fort Norman during February and March 1980.

The observed densities compare closely with earlier surveys of moose in tne Mackenzie Valley, but are lower than those for some other regions of northwest North America. A population of 1200 was estimated for the river valleys including the Mackenzie, and 300 for the Mackenzie Delta. This includes a visibility correction factor of x2. Future survey effort should be allocated on a unit by unit basis with greatest effort going to areas of heavy hunting and industrial development.

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INTRODUCTION

This study was designed to obtain information on the numbers and distribution of moose in the most heavily hunted areas of the Inuvik Region. Moose are an important meat source for most communities below the treeline. In 1979, an estimated 258 moose were taken by hunters in these communities (Wildlife Officer hunter kill data). Estimates indicate that moose provided 30% of the fresh meat available to these communities. The management of this resource, therefore, has strong economic and social implications in addition to ecological considerations.

Previous surveys in the region have examined limited areas, such as Game Management Zones described in the old Game Ordinance (1960 [2nd] C.2s1). Strong (1973) and Hunter (1975) both conducted surveys in Game Management Zones 23 and 20, in the Arctic Red River area. Walton-Rankin (1977) reported on 1972-73 surveys of the islands in the Mackenzie River between Fort Simpson and the Mackenzie Delta, as well as the proposed Mackenzie Valley Pipeline route. Some comparisons between these earlier surveys and this study are possible, and assist in determining the trend of the moose population in the Inuvik Region.

METHODS

The Canadian Wildlife Service Atlas of Wildlife Habitat Inventory Maps (Prescott et al. 1973) provided a basis for determining the areas to be surveyed. We surveyed all areas recorded as class 1 wintering habitat. Major river valleys and their tributaries were surveyed, especially when the Area Wildlife Officer indicated that these were favoured hunting areas.

In the Mackenzie River Delta, we used a strip transect survey with lines 10 km apart, oriented east-west along the Military Grid lines (Fig. 1). We used a Cessna 185 aircraft on wheel-skis and flew at an altitude of 120 m and an airspeed of 190 kph. The strip width was 400 m on either side of the plane. The navigator rode in the front right seat and plotted the observations of two rear seat observers on 1:250,000 scale maps. The observers recorded their counts and the location code using cassette tape recorders. The observers recorded any moose sighted as on or off transect, and noted whether the tracks they saw were fresh or old. No attempt was made to follow the tracks.

In the remainder of the survey area (MRT), which included the Mackenzie River Valley and all major tributaries except two, a complete count was attempted (Fig. 2). We used a Helio-Courier aircraft with one observer/navigator in the front right seat and one observer in the left rear seat. We flew at an altitude of 120 m and an airspeed of 160 kph. If moose tracks were seen, we followed them until the moose was sighted or tracking became too difficult. Groups of moose were circled until the observers were satisfied with the count. When moose could not be sighted, tracks

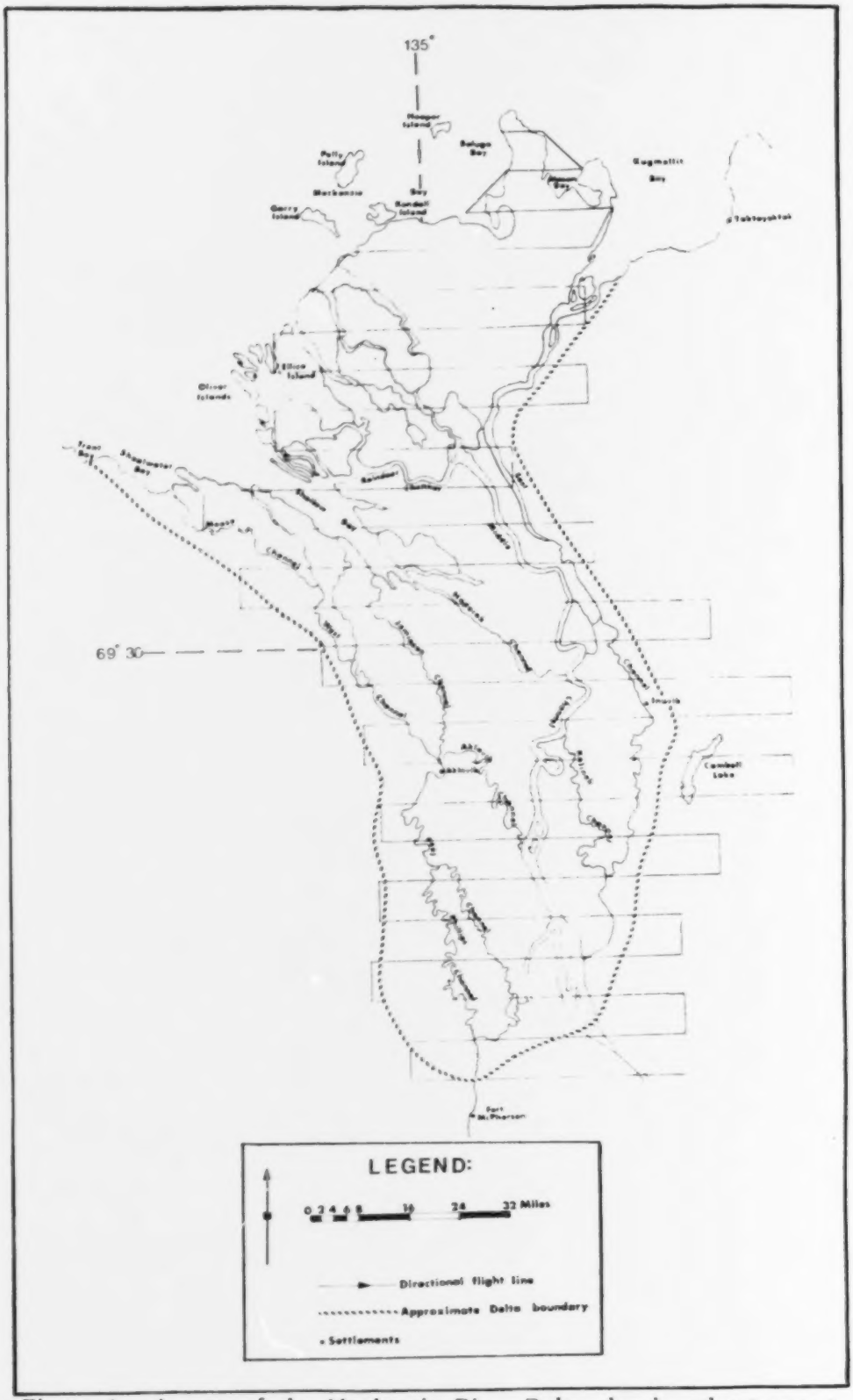

Figure 1. A map of the Mackenzie River Delta showing the transect lines flown.

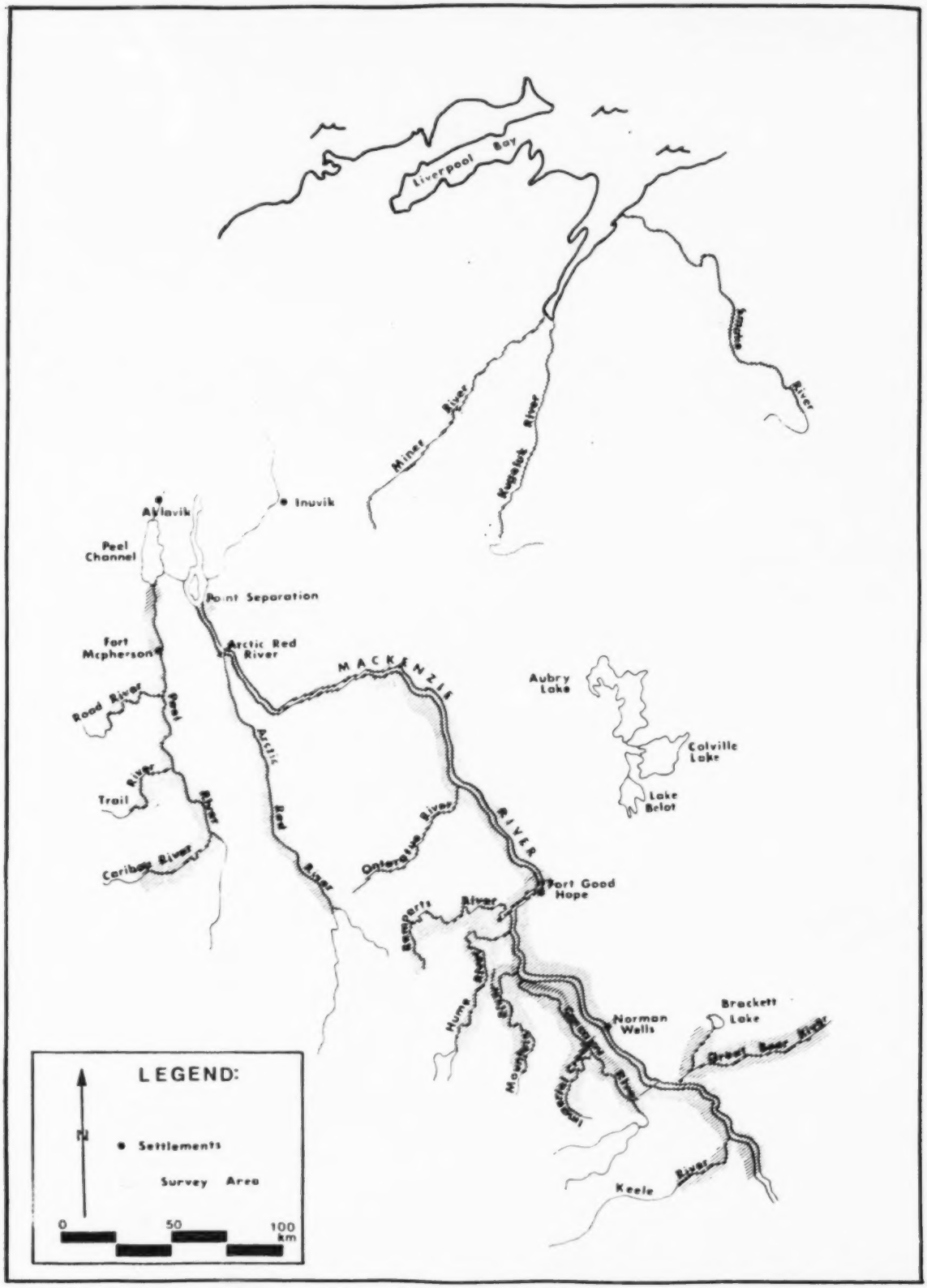

Figure 2. A map of the northern Mackenzie River Valley and its tributaries along which a total count of moose was attempted.

were subjectively recorded as fresh or old. Sighting locations were recorded on 1:250,000 scale maps by the front seat observer. For the Hume and Ramparts Rivers, two tributaries of the Mackenzie River that flow through a large lowland, a complete count was attempted along the rivers only; no attempt was made to survey the lowland areas around the rivers. This same technique was used to survey the Miner, Smoke, and Kugaluk Rivers east of Inuvik.

All surveys were flown between 12 February and 1 March 1980, to take advantage of the longer daylight hours and the suspected concentration of moose in the best wintering habitat. The original map sheets, cassette tapes and transcribed data are held in the Inuvik Regional Office, Renewable Resources.

RESULTS

Mackenzie Delta

In the Mackenzie Delta, the area sampled was 1278 km^2 (Fig. 1) and the area surveyed was 14,880 km^2, giving 8.6% coverage. There were 12 moose seen on transect for a density index of 0.01 moose/km^2. This indicates a total population of 149 moose in the Delta (14,880 km^2 x 0.01 moose/km^2).

MRT

Two density indices were calculated for each unit in MRT (Fig. 2). The first included only those moose actually seen and the second also included fresh tracks. There were 562 moose observed; if fresh tracks are included a total of 717 observations were made. Areas were determined for each unit (Table 2) using 1:250,000 scale maps or 1:500,000 scale maps where available. Over relatively large units (sample area > 100 km^2) the density indices ranged from 0.01 moose/km^2 to 0.27 moose/km^2 (Table 2). If fresh tracks were included as sightings the indices range from 0.06 moose/km^2 to 0.28 moose/km^2. The density index for MRT (3895 km^2) was 0.10 moose/km^2 (Table 2) or 0.14 moose/km^2 if fresh tracks were included.

River Valleys

Along the Hume and Ramparts Rivers 184 moose were observed in 475 km of flight, or 0.39 moose/km^2 (Fig. 1). Along the Miner,

Table 1. Sightings of moose and moose tracks in MRT and Mackenzie Delta.

Date	Number of sightings				
	Cow	Calf	Bull	Other	Fresh tracks
MRT					
Feb. 12	6	3	0	3	14
13	2	1	2	2	15
14	14	2	9	12	22
15	16	10	3	5	22
16	7	1	0	3	22
19	3	4	10	32	35
20	5	5	2	62	9
21	3	4	1	40	14
22	16	16	4	135	1
23	14	16	4	85	1
Total seen		562			
Total fresh tracks		155			
Total observations		717			
Mackenzie Delta					
Feb. 24	0	0	0	0	4
25	3	2	0	2	35
26	0	1	0	0	11
29	1	1	2	0	2
Mar. 01	5	1	19	5	117
Total seen		42			
Total fresh tracks		169			
Total observations		211			
Grand Total	95	67	56	386	324

Table 2. Summary of observations and density indices for each unit in MRT.

Sample unit	Area (km^2)	Obs. (y)	Density Index (y/km^2)	Obs. and tracks (y^1)	Density Index (y^1/km^2)
Birch Island to Fort Norman	225	9	0.04	23	0.10
Fort Norman to Sans Sault Rapids	506	24	0.05	33	0.07
Sans Sault Rapids to Fort Good Hope	237	16	0.07	29	0.12
Fort Good Hope to Little Chicago	203	29	0.14	36	0.18
Little Chicago to Point Separation	264	72	0.27	73	0.28
Keele River	92	4	0.04	9	0.10
Fort Norman Uplands area	161	3	0.02	14	0.09
Great Bear and Brackett Rivers	249	2	0.01	19	0.08
Mountain and Carcajou Rivers	683	76	0.11	115	0.17
Ontaratue River area	244	21	0.09	36	0.15
Arctic Red River	532	91	0.17	104	0.20
Mainstream Peel River	324	9	0.03	20	0.06
Peel River Tributaries	175	23	0.13	39	0.22

Kugaluk and Smoke Rivers (Fig. 2), 30 moose were observed in 288 km of flight, or 0.10/km. It was not possible to accurately calculate the area surveyed in the flights along rivers because flying was limited to the immediate edge of the river and the strip varied in width depending on topography and vegetation. Both crews, however, felt that these river valleys represented the greatest concentrations ot moose in their respective survey areas. A summary of the location codes for each sample unit is presented in Appendix 1 and can be used with the original maps to locate individual sightings.

DISCUSSION

Moose density in the study area appears to be low compared with some other ranges in North America, but is comparable to other areas in the Northwest Territories. Peek et al. (1976) reported moose densities averaging 0.77 moose/km^2 over a large area in northeastern Minnesota, with densities reaching 1.93 moose/km^2 in some parts of the area. Evans et al. (1966) observed 0.17 moose/km^2 on the Yukon River Flats and 1.46 moose/km^2 in the Kenai National Moose Range in Alaska. Both of these surveys used stratified quadrat survey techniques with intensive searching. It was determined that this technique yields results up to four times higher than linear strip transects, and at least twice as high as intensive total counts.

Walton-Rankin (1977) reported densities as high as 1.4 moose/km^2 in the Sans Sault Rapids area, although no information on the size of the area involved was presented. A small (1 km^2) area at the confluence of the Arctic Red and Cranswick Rivers contained 15 moose, and the big island in the Carcajou River immediately upstream from the mouth contained 18 moose (area - 13.4 km^2, density - 1.3 moose/km^2) at the time of the survey.

Flook and Bryant (1957) reported moose densities of 0.030, 0.016, and 0.046 moose/km^2 for three surveys done in the winters of 1954, 1955 and 1956, respectively, in the northern Mackenzie District. All were line transect surveys. Unfortunately, maps giving the locations of the transects flown were unavailable, precluding direct comparison with the results of this study.

No estimate of observer bias or sightability of moose was made during this survey. It is generally accepted that not all moose present in a study area are counted (e.g., Evans et al. 1966, Caughley 1977, Timmermann 1974). LeResche and Rausch (1974) reported that experienced observers recorded only 68% of the moose known to be located in intensively searched areas and inexperienced observers recorded only 43% of the moose present. In this survey only two of the five observers had recent aerial survey experience (Brackett - caribou, Males - sheep). It is very likely that a large, but unknown, number of animals in the study area were not counted.

Survey design also affects the number of moose seen. Decker and Mackenzie (1980) using a linear strip survey, saw only about half of the moose reported a year later in essentially the same area by Donaldson and Fleck (1980), who used a stratified quadrat survey. This survey was a combination of linear strip (Mackenzie Delta and along some river valleys), and total count surveys. In most areas, the total count survey closely resembled a quadrat survey since the habitat blocks to be surveyed were usually small and well-defined (islands, points or oxbows along rivers). The blocks were not, however, randomly chosen or of uniform size and, therefore, strict comparison with the quadrat surveys is not possible.

Calves represented 11.0% (62/562) of the moose seen in MRT, close to the 13.3% estimated in the lower Liard valley population by Donaldson and Fleck (1980). Community kill returns during 1979 for MRT indicate an estimated 187 moose were harvested (Wildlife Service Records), or 33.3% (187/562) of

the moose seen in MRT. Considering that we surveyed all areas hunted by the communities, a harvest of 33.3% would be expected to cause a decline in the population and the annual kill. In fact, the kill has remained relatively constant for years, and preliminary returns for 1980 (Wildlife Officer monthly reports) indicate a kill of at least 192 moose, virtually unchanged from 1979. It appears, therefore, that the population was underestimated in this survey. A population of at least double that estimated in this study is probable (1124 moose). Likewise, tne Delta population estimate of 149 moose can be doubled to arrive at a more realistic value (300) considering the conservative nature of transect surveys and the inexperienced observers.

RECOMMENDATIONS

1. Because the results of this survey were reported by unit, future surveys should be considered on a unit by unit basis with survey effort going to areas of heavy hunting and industrial development.

2. Increased activity along the Mackenzie Valley corridor will result in greater hunting pressure. The harvest in this area must be monitored closely to assess the need for more strict management controls.

LITERATURE CITED

Caughley, G. 1977. Sampling in aerial survey. J. Wildl. Manage. 41(4): 605-615.

Decker, R., and J. Mackenzie. 1980. The population, distribution and density of moose in the Liard Valley, 1978. NWT Wildl. Serv. File Rep. No. 7. 22 pp.

Donaldson, J.L. and S. Fleck. 1980. An assessment of potential effects of the Liard Highway on moose and other wildlife populations in the lower Liard Valley. NWT Wildl. Serv. Contract Rep. No. 2. 36 pp.

Evans, D., W.A. Troyer and C.J. Lensink. 1966. Aerial census of moose by quadrat sampling units. J. Wildl. Manage. 30(4): 767-776.

Flook, D.R. and J.E. Bryant. 1957. Aerial survey of moose, Mackenzie District, NWT, March 1956, with comparisons to surveys in January and December 1953, March 1954 and February 1955. Wildl. Serv. Ottawa. Unpubl. rep. 34 pp.

Hunter, R. 1975. Moose survey Zone 20. NWT Wildl. Serv. unpubl. rep. 7 pp.

LeResche, R.E. and R.A. Rausch. 1974. Accuracy and precision of aerial moose censusing. J. Wildl. Manage. 38(2): 175-182.

Peek, J.M., D.L. Urich and R.J. Mackie. 1976. Moose habitat selection and relationships to forest management in northeastern Minnesota. Wildl. Monog. No. 48. 65 pp.

Prescott, W.H., G.L. Erickson, L.E. Walton and D.G. Smith. 1973. Atlas of wildlife habitat inventory maps - moose. Can. Wildl. Serv. Prep. for Northern Pipelines Task Force on Oil Development.

Timmermann, H.R. 1974. Moose inventory methods. A review. Naturaliste Can. 101(3&4): 615-629.

Strong, J.T. 1973. Zone 23 Moose Survey, NWT Wildl. Serv. unpubl. rep. 3 pp.

Walton-Rankin, L. 1977. An inventory of moose habitat of the Mackenzie Valley and Northern Yukon. Can. Wildl. Serv. Mackenzie Valley Pipeline Invest. 39 pp.

Appendix A. Sighting location codes by unit (refer to original survey maps).

Sample unit	Sighting location codes
Birch Island to Fort Norman	6-26
Fort Norman to Sans Sault Rapids	1-5, 148-158, 340-346
Sans Sault Rapids to Fort Good Hope	81-100, 347
Fort Good Hope to Little Chicago	300-309, 326-339
Little Chicago to Point Separation	232-277
Keele River	35-43
Fort Norman Uplands area	32-34, 44-53, 147
Great Bear and Brackett Rivers	127-146
Mountain and Carcajou Rivers	56-80, 101-126
Ontaratue River area	278-284, 310-325
Arctic Red River	220-231, 432-468
Mainstream Peel River	175-177, 193, 204-206, 214-219
Peel River Tributaries	178-192, 194-203, 207-213
Hume and Ramparts Rivers	348-382, 410-431
Miner, Kugaluk and Smoke Rivers	D74-D171
Mackenzie Delta	D1-D73